

# W A R N I N G



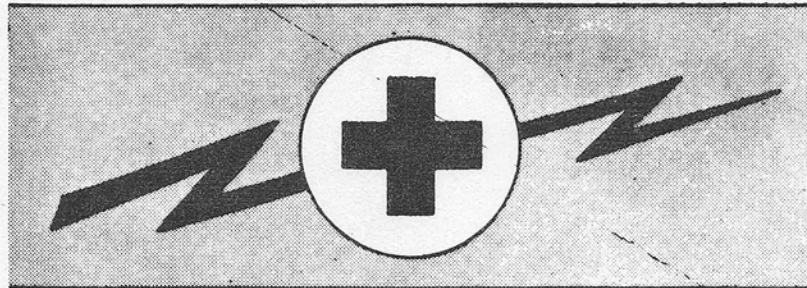
RA PD 461690

## SAFETY MEASURES FOR HANDLING HIGH-PRESSURE AIR SYSTEMS

1. Personnel who handle high-pressure airhoses and components shall be thoroughly trained in the use and maintenance of the equipment, and in the application of safety measures to protect against existing hazards. Comply with all precautionary measures.
2. Inspect all systems using high-pressure air before, during, and after use for leaks, defective airhoses, improperly adjusted valves, malfunctioning regulators and relief valves, and the presence of foreign materials in the system.
3. Clear all airhoses and valves at regular intervals. Release pressure through bleeder valves before disconnecting any lines or hoses or making any repairs.
4. When pressurizing a system, personnel operating the valves shall stand clear of hose connections, and shall turn the valves slowly to prevent shock loading or pressure surges which may damage hoses or components. Close valves manually to prevent overtightening; never tighten with a wrench or tool.
5. Observe the following precautions pertaining to high-pressure airhoses:
  - a. The minimum bending radius for flexible airhoses shall be: 4 inches for 1/4-inch ID hose; 6 inches for 3/8-inch ID hose; 7 inches for 1/2-inch ID hose; 9-1/4 inches for 3/4-inch ID hose.
  - b. Never coat or paint an airhose, because this impairs the normal breathing tendency of the airhose.
  - c. Depressurize and protect airhoses from the sun when not in use.
  - d. Do not kink, twist, strike, walk on, run over, jerk, or otherwise abuse airhoses.
  - e. Allow 2 feet of slack for each 100 feet of airhose to compensate for contraction during pressurization.
  - f. Secure high-pressure airhose at 36-inch intervals. Use equipment straps, ground stakes, or sandbag as necessary.
  - g. 3500 PSIG air pressure is used in the operation of this equipment.

*Note:* For inspection and test of air and other gas compressors refer to TB 742-93-1.

## WARNING



RA PD 404264

### HIGH VOLTAGE

is used in the operation of this equipment

### DEATH ON CONTACT

may result if personnel fail to observe safety precautions

Be careful not to contact high-voltage connections or 120-volt ac input connections when installing or operating this equipment.

Operators aiding the organizational-maintenance technician should observe the following warnings.

Normally, the organizational-maintenance technician should not be permitted to work on electronic equipment unless there is another person nearby who is familiar with the hazards of the equipment and is competent in administering first aid.

In all possible cases, power to the equipment should be cut off before beginning work on equipment. Particular care must be taken to ground any capacitor likely to hold a dangerous potential. When working inside the equipment after the power has been turned off, always ground every part before touching it.

Whenever the nature of the operation permits, only one hand should be used for working on electronic equipment. This precaution reduces the probability of current flowing through vital organs of the body, thereby causing fatal injuries.

For Artificial Respiration, refer to FM 21-11.



TECHNICAL MANUAL

No. 9-1440-252-34

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
WASHINGTON 25, D.C., 5 August 1960

**HERCULES MONORAIL LAUNCHER,  
LAUNCHING-HANDLING RAIL,  
SIDE TRUSS,  
LOADING RACK SUPPORT,  
LAUNCHER TRANSPORT MODIFICATION KIT,  
LAUNCHER SUB-SURFACE FOUR-RACK MODIFICATION KIT,  
AND LAUNCHER BASIC ACCESSORY KIT**

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\*This technical manual supersedes TM 9-5097-5, 20 December 1957 and TB 9-1440-252-34/29, 27 April 1962.

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- 1. Maintenance of aircraft engine and propeller
- 2. Maintenance of aircraft fuel system
- 3. Maintenance of aircraft electrical system
- 4. Maintenance of aircraft landing gear
- 5. Maintenance of aircraft wing and fuselage
- 6. Maintenance of aircraft engine and propeller
- 7. Maintenance of aircraft fuel system
- 8. Maintenance of aircraft electrical system
- 9. Maintenance of aircraft landing gear
- 10. Maintenance of aircraft wing and fuselage

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MAINTENANCE OF LANDING GEAR  
SECTION MODIFICATION

- 1. Maintenance of landing gear
- 2. Maintenance of landing gear
- 3. Maintenance of landing gear
- 4. Maintenance of landing gear
- 5. Maintenance of landing gear
- 6. Maintenance of landing gear
- 7. Maintenance of landing gear
- 8. Maintenance of landing gear
- 9. Maintenance of landing gear
- 10. Maintenance of landing gear

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## CHAPTER 1

### INTRODUCTION

#### Section I. GENERAL

##### 1. Scope

a. This is one of a series of technical manuals on operation, emplacement, and maintenance of the NIKE-HERCULES and improved NIKE-HERCULES Air Defense Guided Missile Systems. Refer to TM 9-1400-250-12/2 for a listing of publication indexes, administrative publications, forms and records publications, supply publications and technical manuals covering these systems.

b. This manual is published for the information and guidance of personnel responsible for direct and general support maintenance of the HERCULES monorail launcher, the launching-handling rail, and the launcher-associated equipment, including launcher and launching section winterization kits and modification kits for mobile and permanently emplaced launching sections.

c. The instructions in this manual are intended for maintenance specialists who have been thoroughly trained in maintenance practices and have had previous experience in performing testing, repair, and adjustment procedures on similar types of guided missile equipment. The instructions contain information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations. To implement the normal performance of trouble shooting, disassembly, repair, replacement, and assembly of the equipment covered by this manual, description and theory of operation information is also provided.

##### 2. Related Publications

Information which is intended primarily for the using organization has been omitted from this manual since such information is available

to maintenance personnel in the operation manual, TM 9-1440-250-10/1, or organizational maintenance manual, TM 9-1440-250-20/1. General maintenance procedures, abbreviations, reference designations, and symbols are given in TM 9-1400-250-15 3. Reference is made to TM 9-1440-250-12/2 for removal, disassembly, assembly, and installation procedures of certain components of the HERCULES mobile launching section to eliminate duplication of coverage.

##### 3. Technical Manual Effectivity

This manual is technically correct through the serial numbers of major items listed in table I, provided all pertinent outstanding modification work orders (MWO's) listed and described in table III have been incorporated. For a complete list of MWO's applicable to the equipment, refer to TB 9-1425-250-15/1.

*Table I. Effectivity of Major Items*

Equipment	Serial numbers
Blast shield .....	1 and subsequent
<sup>1</sup> HERCULES monorail launcher	1021 and subsequent, and 50000 and subsequent
Launcher basic accessory kit.....	21 and subsequent
Launcher field modification kit..	1 and subsequent
Launcher transport modification kit	1021 and subsequent
<sup>1</sup> Launching-handling rail .....	1081 and subsequent, and 50000 and subsequent
Loading rack support .....	1141 and subsequent
USARAL launching section modification kit	1001 and subsequent
USAREUR launching section modification kit	1049 and subsequent

See footnote at end of table.

Table I. Effectivity of Major Items--Continued

Equipment	Serial numbers
Side truss .....	1281 and subsequent
Transport modification kit.....	1 and subsequent

<sup>1</sup> This equipment is manufactured under two series of serial numbers: 1000 series and 50000 series.

## 4. (Deleted)

Table II. (Deleted)

## 5. (Deleted)

## 6. Forms, Records, and Reports

a. *General.* Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of the materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to maintenance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of materiel upon completion of its repair.

b. *Authorized Forms.* Refer to TM 38-750 for instructions on the use and completion of all forms required for operating and maintaining the equipment covered by this manual.

c. *Field Report of Accidents.* The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in AR 385-40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. *Report of Unsatisfactory Equipment or Materials.* Any deficiencies detected in the equipment covered herein, which occur under the circumstances indicated in AR 700-38, should be immediately reported in accordance with the applicable instructions in cited regulation, using DA Form 468.

e. *Reporting of Equipment Manual Improvements.* The direct reporting of errors, omissions and recommendations for improving this manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed using pencil, pen, or typewriter. DA Forms 2028 will be completed by the individual using the manual and forwarded directly to Commander, U.S. Army Missile Materiel Readiness Command, ATTN: DRSMI-NPM, Redstone Arsenal, Alabama 35809.

f. *Report of Failure or Replacement of Part.* In order to comply with the requirements of AR 700-37, report every part that fails or is replaced, on DA Form 9-110, Guided Missile Component Evaluation Data Report, and forward the form in accordance with its instructions.

## 7. (Deleted)



## Section II. DESCRIPTION AND DATA

### 8. General

a. The HERCULES monorail launcher (figs. 2 and 3) performs all the prelaunch functions required for guided missile MIM-14A or MIM-14B. Organizational maintenance and a complete description of the launcher in relation to the guided missile launching set are contained in TM 9-1440-250-10/1.

b. The launcher consists essentially of a launcher base, launcher erecting beam, strut arm, launcher strut, power distribution box, hydraulic pumping unit and, when installed on the launcher, a launching-handling rail (fig. 4).

c. For explanatory purposes, the launcher is divided into three main groups: the mechanical group, the electrical group, and the hydraulic group.

### 9. Mechanical Group

#### a. Launcher Base.

- (1) The launcher base (fig. 3) is a welded rectangular steel structure with a main trunnion and four trunnion bearings supporting the launcher erecting beam. Two secondary trunnions support the launcher strut.

- (2) There are eight launcher lift points on the base: two each on the front and rear, and four near the center at the lifting center of gravity.

#### b. Launcher Erecting Beam.

- (1) The launcher erecting beam (fig. 3) is the major moving part of the launcher. It is raised and lowered by two power and two equilibrator cylinders. These cylinders are connected to the main trunnion and to the launcher strut.
- (2) Two guide pins (fig. 2) located on the front supports of the launcher base are positioned to match with guide holes on the underside of the front outrigger. When engaged in the guide holes, the pins serve to position the beam in the down-lock mechanism.
- (3) Gasket covers (fig. 2) are provided on the beam for access when performing maintenance inside the beam. A front end cover (fig. 3) and a beam center cover provide access to the forward and rear wedge groups (fig. 41).

## Section II. DESCRIPTION AND DATA

### 1. General

The 155 mm howitzer is a self-propelled gun. It is designed to fire 155 mm projectiles at a range of 15 to 20 km. The gun is mounted on a tracked chassis and is capable of firing in any direction. The gun is designed to be used in a variety of environments, including urban areas and mountainous terrain.

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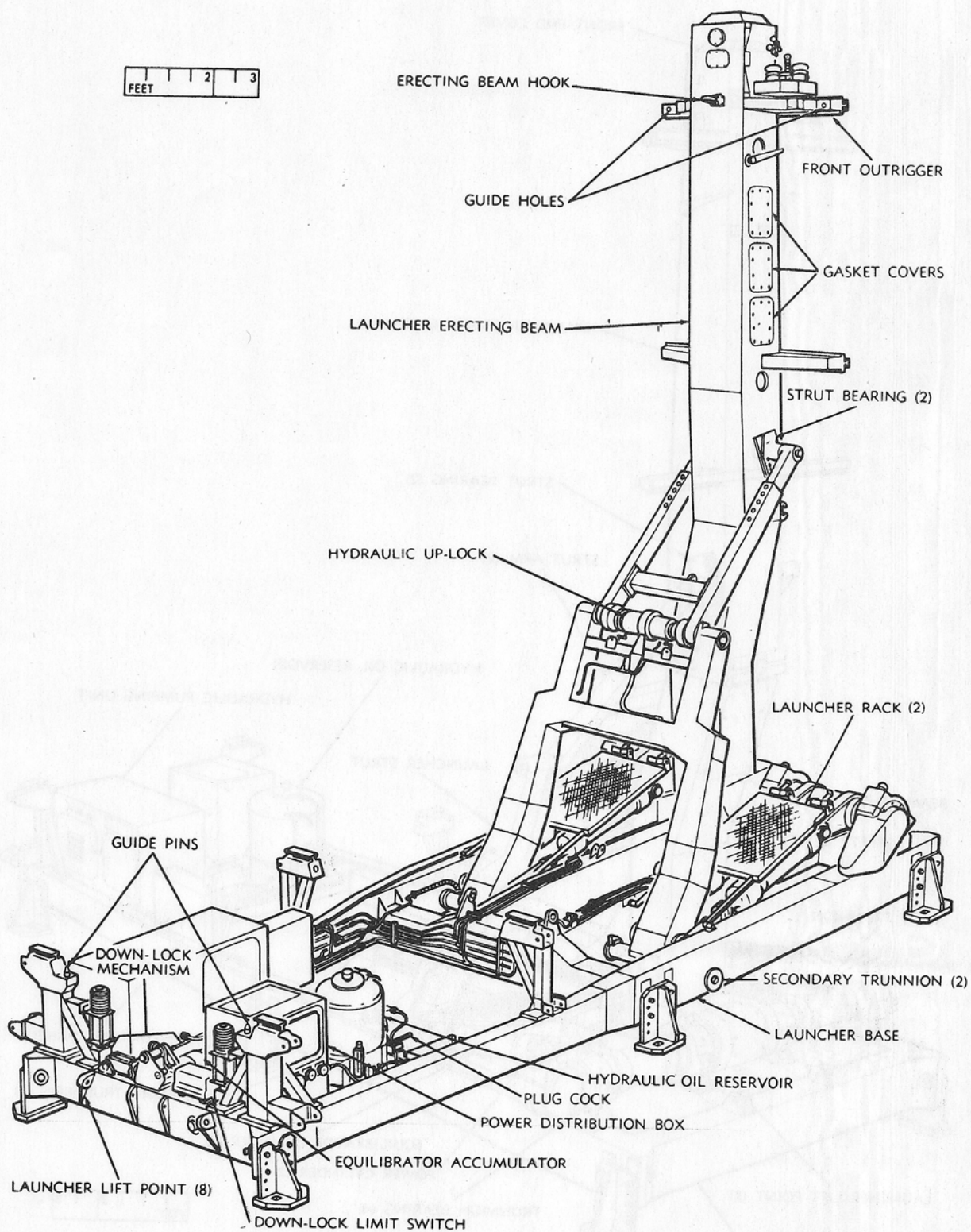
### 2. Mechanical Group

The mechanical group consists of the engine, transmission, and drive shafts. The engine is a diesel engine and is designed to provide power to the gun. The transmission is a manual transmission and is designed to allow the operator to select different gears. The drive shafts are designed to transmit power from the engine to the wheels.

- (1) The gun is designed to be used in a variety of environments, including urban areas and mountainous terrain. It is capable of firing in any direction and is designed to be used in a variety of environments, including urban areas and mountainous terrain.
- (2) The gun is designed to be used in a variety of environments, including urban areas and mountainous terrain. It is capable of firing in any direction and is designed to be used in a variety of environments, including urban areas and mountainous terrain.
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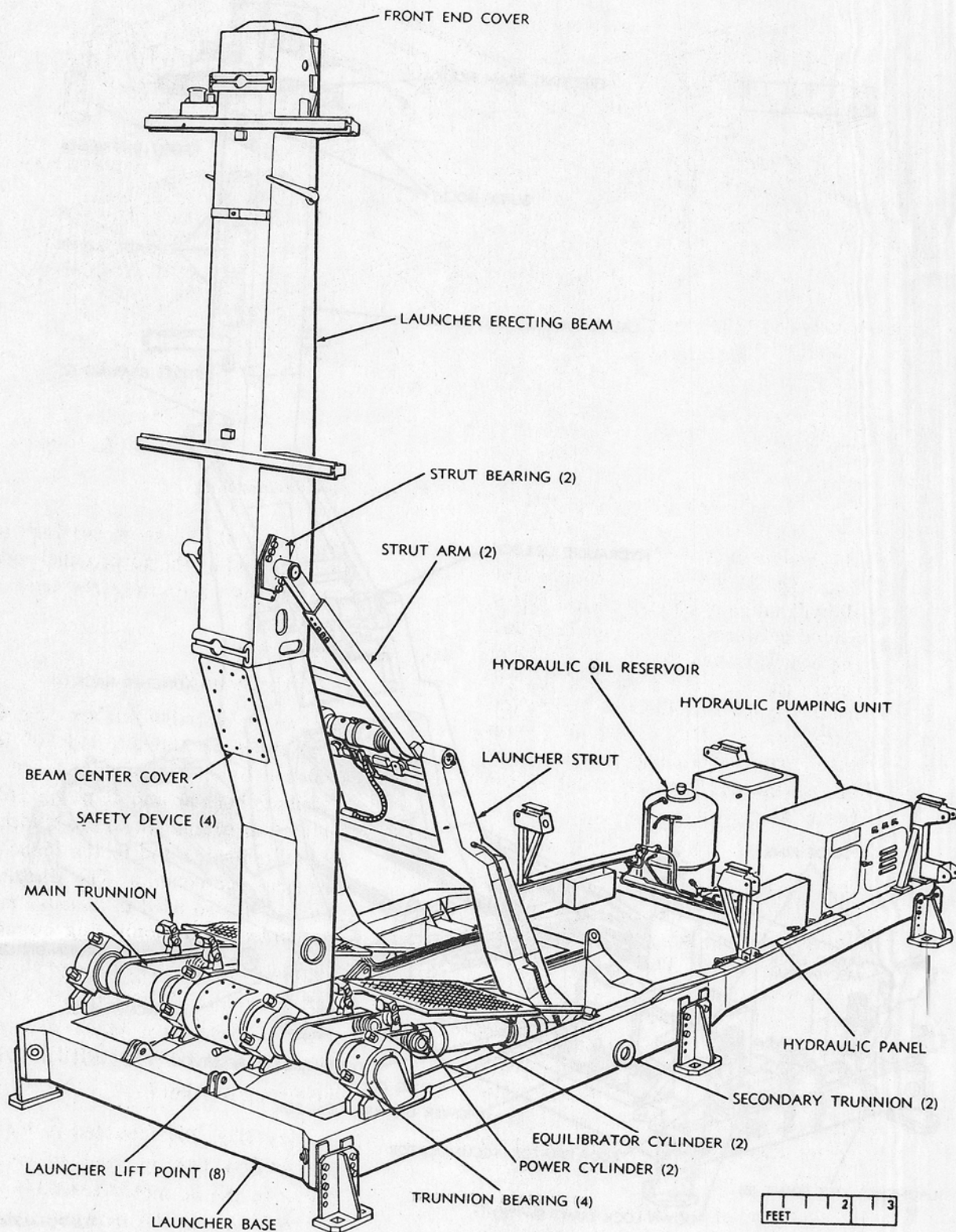






RA PD 463768

Figure 2. Hercules monorail launcher - front view.



RA PD 463889

Figure 3. Hercules monorail launcher - rear view.



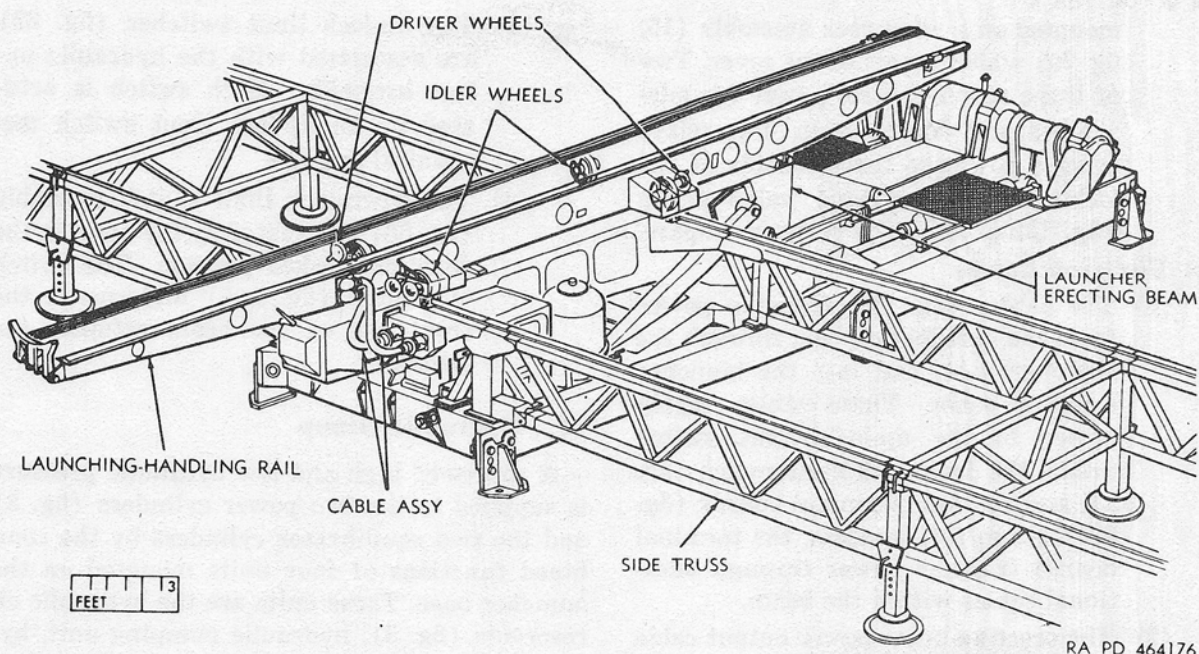


Figure 4. Launching-handling rail on Hercules monorail launcher.

- (4) The hollow center of the main trunnion (fig. 3) serves as a conduit for all hydraulic lines and electrical cables routed between the launcher base and the beam. Four arms on the trunnion serve as connecting points to the beam for each of the four cylinders. Safety devices (fig. 3) are located on each arm permitting the launcher racks (fig. 2) free movement as the beam is erected.

*c. Strut Arms and Launcher Strut.*

- (1) The strut arms (fig. 3) and the launcher strut assist raising and lowering the beam when put into motion by the cylinders. The strut arms and launcher strut are held mechanically rigid in the up-and-locked position by the hydraulic up-lock (fig. 2). The launcher strut (fig. 3) pivots about the secondary trunnions on the launcher base and the strut arms pivot about the strut bearings on the beam.
- (2) The angle of elevation of the beam in the raised position is adjustable. It is determined by the adjustable

positioning of the strut bearings on the beam and by the adjustable length of the struts within the strut arms.

## 10. Electrical Group

### *a. Power Distribution Box.*

- (1) The power distribution box (fig. 2) is mounted on the left side of the launcher base. Its functions are to distribute both ac and dc power from the section equipment to the launcher control-indicator and to the launcher electrical components. The distribution box is also used to transfer missile control and monitoring circuits.
- (2) The distribution box has a removable cover (fig. 70). A hinged access door permits access to a panel that contains a MAIN POWER BRKR switch and circuit breakers.
- (3) A relay (fig. 75) mounted inside the distribution box is used to control power to the ac motor assembly (24, fig. 102) inside the hydraulic pumping unit (fig. 3). Five relays are

mounted on a relay rack assembly (15, fig. 70) which is part of the cover. Two of these relays control power for missile heat and booster heat. Two relays control power to the solenoids of the locking wedge solenoid valve group (fig. 132). The fifth relay is a spare.

#### b. Electrical Cables.

- (1) The cables (fig. 79) transfer power from the distribution box, through the launcher base, and into the launcher erecting beam. These cables supply power to the up-lock limit switch group, the down-lock limit switch (fig. 2), and the four terminal boards (fig. 90). From this location, the terminal boards transfer power through additional cables within the beam.
- (2) The erecting beam power output cable assembly (fig. 91) transfers power from the beam through the two rail power cable assemblies (fig. 224) to the terminal boards (fig. 218). From this location, the terminal boards transfer power to the missile-away switch (fig. 220) and the missile umbilical wiring harness assembly (18, fig. 223.1) and missile umbilical cable assembly.

#### c. Electrical Switches.

*Note.* In mobile installations, a jumper wire allows the launcher erecting beam to be raised during deflector emplacement without a launching-handling rail on the launcher. Remove the jumper wire in accordance with TM 9-1440-251-10 prior to elevating a NIKE-AJAX launching and handling rail.

- (1) The NIKE-AJAX launching and handling rail lock switches (fig. 104) are actuated by linkages whenever a NIKE-AJAX rail M1A1 or M1A2 is moved onto the beam.
- (2) The forward lock and unlock switch assemblies (fig. 95) and the rear lock and unlock switch assemblies (fig. 96) of the lock and unlock cable assemblies are mechanically opened or closed by the movement of the forward or rear wedge groups (fig. 41), respectively.

- (3) The up-lock limit switches (fig. 89) are associated with the hydraulic up-lock assembly. Each switch is actuated by an up-lock limit switch mechanical linkage.
- (4) The down-lock limit switch assembly (fig. 86) is actuated by the beam in the down-and-locked position. The switch trip latch (fig. 105) underneath the front end of the beam actuates the switch.

### 11. Hydraulic Group

A source of high and low hydraulic pressure is supplied to the two power cylinders (fig. 3) and the two equilibrator cylinders by the combined functions of four units mounted on the launcher base. These units are the hydraulic oil reservoir (fig. 3), hydraulic pumping unit, hydraulic panel, and the equilibrator accumulator (fig. 2).

*a. Power Cylinders and Equilibrator Cylinders.* These four interchangeable cylinders are mounted between the main and secondary trunnions. Spring-loaded internal and external dashpots (fig. 31) are incorporated in each cylinder to reduce bottoming shock during operation.

#### b. Hydraulic Oil Reservoir (fig. 8).

- (1) The reservoir, pressurized with air at 20 psi, supplies the axial pistons pump in the pumping unit with a positive flow of hydraulic fluid. Compressed air is supplied to the reservoir from the compressed gas cylinder located within the pumping unit.
- (2) The air pressure regulating valve, located in the pneumatic line between the gas cylinder and the reservoir, reduces the high-pressure air to low-pressure air.
- (3) The plug cock permits pressurization or depressurization of the reservoir.

#### c. Hydraulic Pumping Unit.

- (1) The hydraulic pumping unit (fig. 3) contains the major components of the launcher hydraulic system. Hydraulic



system pressure is furnished from this unit by a variable displacement axial pistons pump (fig. 8) which is driven by a 20-hp, 3-phase, 400-cps ac motor. The axial pistons pump is designed to operate the systems by delivering a non-pulsating flow of hydraulic fluid under continuous working pressure in varying volume as required for system operation.

- (2) Nine hydraulic valves function in the system together with an air pressure regulating valve, a fluid pressure dampener, a compressed gas cylinder, two pressure fluid filters, a hydraulic surge accumulator, and three air filler valves. Five pressure gages on the panel of the pumping unit indicate pressures for the compressed gas cylinder, hydraulic oil reservoir, equilibrators accumulator, hydraulic surge accumulator, and axial pistons pump.

*d. Equilibrator Accumulator.*

- (1) The equilibrator accumulator (fig. 2) furnishes high-pressure hydraulic fluid to the two equilibrator cylinders (fig. 3). These cylinders provide additional erecting power during the launcher-up cycle and act as primary cylinders during the launcher-down cycle.
- (2) Two valves, located on the launcher base, control the equilibrator accumulator functions. A cam-operated valve (fig. 8) is mounted on the left side of the launcher base. This valve, which opens when the erecting beam is elevated above 70 degrees, bypasses hydraulic fluid from the equilibrator accumulator to the hydraulic oil reservoir. The EQUILIBRATOR SYSTEM BY-PASS valve, when opened, vents hydraulic fluid from both equilibrator cylinders to the reservoir.

*e. Hydraulic Panel.*

- (1) The hydraulic panel (fig. 3) serves as

the distribution center of the launcher hydraulic system. Hydraulic fluid under pressure passes from the hydraulic pumping unit to the panel where it is diverted to the power and equilibrator cylinders, the hydraulic up-lock (fig. 2), and the hydraulic down-lock of the down-lock mechanism.

- (2) The panel contains two speed control valves (fig. 8), four check valves, a safety relief valve, two priority valves and an equilibrator safety relief valve.

*f. MISSILE HYDRAULIC SHUT-OFF Valves.* Two MISSILE HYDRAULIC SHUT-OFF valves (fig. 34) are provided to shut off hydraulic pressure for the missile hydraulic system. One valve shuts off pressure to the loading rack test stations; this valve is located near the power distribution box (fig. 2) on the left side of the launcher base. The other valve (fig. 34) shuts off pressure to the Nike-Ajax launching and handling rail M1A1 or M1A2; this valve is located near the hydraulic panel (fig. 3) on the right side of the launcher base.

## **12. Launching-Handling Rail (fig. 4)**

*a.* The launching-handling rail is an oblong box-type welded steel structure. It is supported by four wheels: two idler wheels and two driver wheels. These wheels permit the rail to be moved along the side trusses and onto the launcher erecting beam.

*b.* Two cable assemblies in the rail connect missile circuits to the control and monitoring circuits that are transmitted through the Hercules monorail launcher.

## **13. Launcher Transport Modification Kit (fig. 5)**

*a.* The launcher transport modification kit is composed of a running gear, a semitrailer retractable support, two clearance lamp, and two tail lamp.

Figure 5. (Deleted)

b. This kit is used together with a prime mover to transport the launcher from one area to another.

### 13.1. HERCULES Mobile Launcher

a. The launcher, a part of the mobile launching-section-modification kit, consists of the transport-modification kit (fig. 5-1), blast shield (fig. 5-2), and launcher-field-modification kit (fig. 5-3).

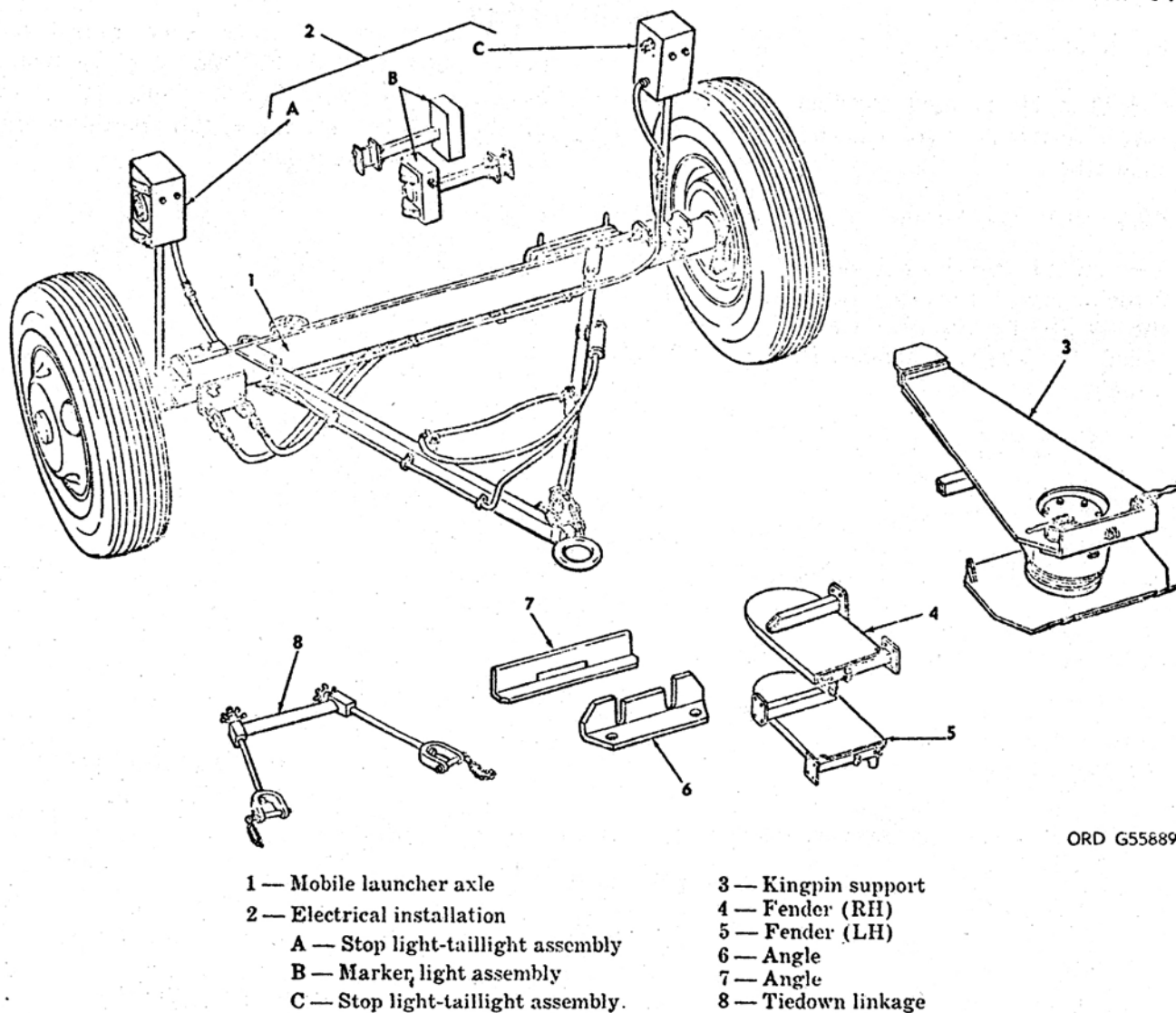
b. Components of the launcher are installed as described in TM 9-1440-251-10. Maintenance coverage will be described in chapter 12 as part of the mobile-launching-section modification-kit mechanical components.

14. (Deleted)

14.1. (Deleted)

14.2. (Deleted)





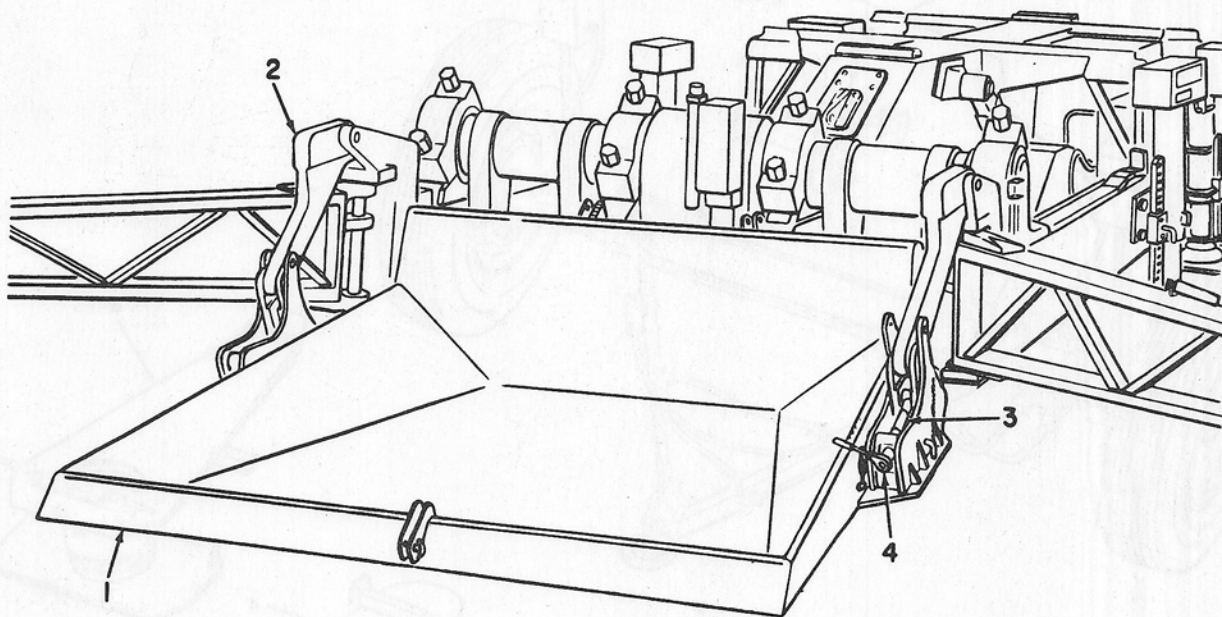
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Figure 5.1. Transport modification kit for the HERCULES mobile launcher.

#### 14.3. (Deleted)

#### 14.4. (USARL) HERCULES USARL Launching Section Modification Kit

a. (USARL). The HERCULES USARL launching section modification kit provides components and hardware required for emplacement of two carriage-mounted HERCULES monorail launchers and two launchers



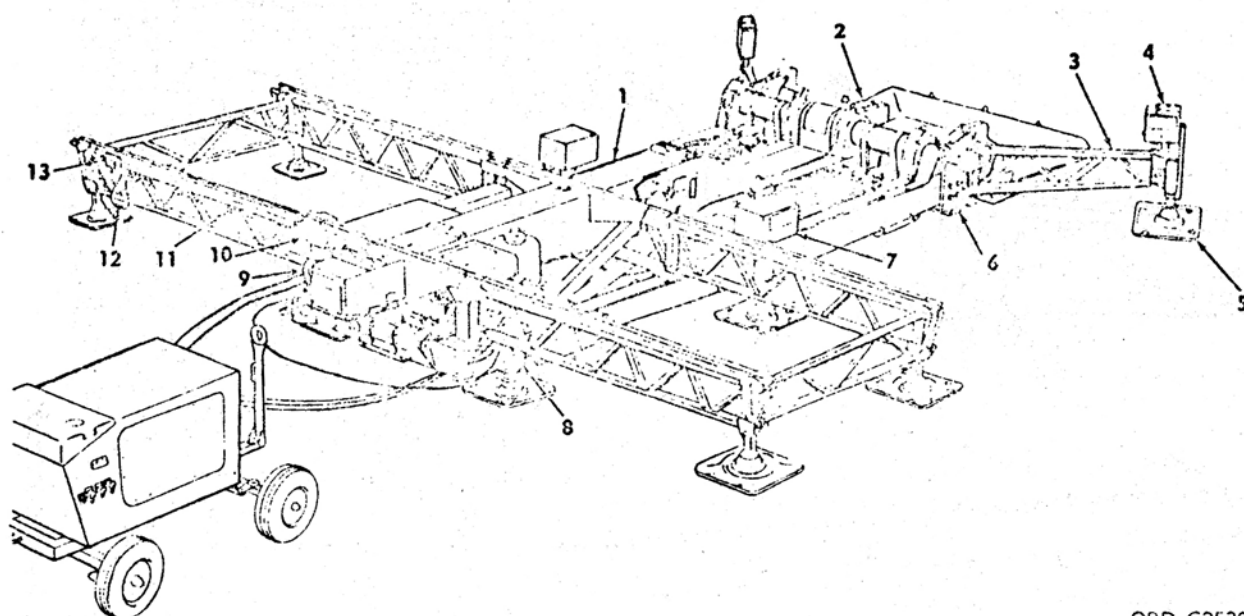
1—Deflector  
2—Arm assembly (2)

3—Rod (2)  
4—Ratchet wrench (2)

ORD G3375801

Figure 5.2. Blast shield for the HERCULES mobile launcher.





ORD G253900

- 1—HERCULES monorail launcher
- 2—Auxiliary jack
- 3—Outrigger (2)
- 4—Outrigger jack (2)
- 5—Mounting plate (11)
- 6—Bracket assembly (2)
- 7—Center jack (2)

- 8—Forward jack (2)
- 9—Loudspeaker with cable assembly
- 10—Loading rack clamp assembly 8522117
- 11—Loading rack clamp assembly 8522118
- 12—Hydraulic test station
- 13—Electrical test station

Figure 5.3. HERCULES mobile launcher M94 and associated equipment.

mounted on concrete pads in a USARAL launching section.

b. (USARAL). After this kit is emplaced, it loses its identity as a kit. Maintenance coverage, as described in chapter 9.4, treats all kit components as part of the USARAL launching section.

#### 14.5. (USAREUR) HERCULES USAREUR Launching Section Modification Kit

a. (USAREUR). The USAREUR launching section modification kit provides components and hardware required for emplacement of three launchers mounted on concrete pads in a USAREUR launching section.

b. (USAREUR). After this kit is emplaced, it loses its identity as a kit. Maintenance coverage, as described in chapter 9.5, treats all kit components as part of the USAREUR launching section.

#### 14.6. (Deleted)

#### 14.7. (Mobile) HERCULES Mobile Launching Section Modification Kit

a. The mobile launching section modification kit provides components and hardware required for emplacement of three launchers mounted on jacks in a mobile launching section.

b. After this kit is emplaced, it loses its identity as a kit. Maintenance coverage, as described in chapter 12, treats all kit components as part of the mobile launching section.

#### 15. Launcher Basic Accessory Kit

The launcher basic accessory kit is installed as described in TM 9-1440-251-10. After installation, the kit becomes part of the HER-

CULES permanently emplaced launching section and loses its identity as a kit. Refer to TM 9-1440-250-20 for maintenance of the stops, etc., of the loading racks comprising the basic accessory kit.

### 15.1. Guided Missile Launcher and Guided Missile Launching Section Winterization Kits

Guided missile launcher and guided missile launching section winterization kits are installed in the launching area of sites where conditions during cold weather operation would adversely affect the operation of equipment. Refer to chapter 11 for maintenance instructions covering the guided missile launcher and guided missile launching section winterization kits.

*a. Guided Missile Launcher Winterization Kit.* One guided missile launcher winterization kit 9027165 (fig. 291) must be installed on each HERCULES monorail launcher before utilizing rocket motor winterization kit 9027320. Electrical power distributed by the launcher

winterization kit is supplied by the power distribution box (fig. 2). The launcher winterization kit also distributes power to the launching section winterization kit as described in *b* below.

*b. Guided Missile Launching Section Winterization Kit.* One guided missile launching section winterization kit 9021103 (fig. 291) provides a power distribution box at each of three test station positions. This winterization kit is required only for installations having a guided missile M6 located at test stations exposed to the elements.

*c. (Mobile) Guided Missile Launcher and Guided Missile Launching Section Winterization Kits.* One guided missile launcher winterization kit 9027165 and one guided missile launching section winterization kit 9978720 are used on each launcher in the mobile configuration. The launcher winterization kit distributes power to the launching section winterization kit which provides a power distribution box at the test station position.

## Section III. DIFFERENCES AMONG MODELS

### 16. Modification Work Orders

Table III lists the Department of the Army Modification Work Orders (DA MWO's) which

have been covered by information included in this technical manual.



Table III. Modification Work Orders

MWO	Model effectivity	Purpose.
9-1440-252-30/10, changes No. 1 and 2	Launching-handling rails 1081 through 5378 and 50000 through 50153.	Replaces lever 8525262 with new lever 9977069, on the launching-handling rail, to reduce the possibility of damage to the lever when repositioning the rail.
9-1440-252-30/15, changes No. 1	Launcher field modification kits 1 through 1442.	Adds baffles and bellows to the mobile launcher emplacement jacks to eliminate oil spillage and ram damage during transit.
9-1440-252-30/17, changes No. 1 and 2	Blast shields 1 through 1179 and associated mobile launchers.	Removes accessory stowage box from the blast shield and adds redesigned stowage box to the mobile launcher, to provide more adequate stowage of launcher accessories and to decrease launcher emplacement and evacuation time.
9-1440-252-30/21	Blast shields 1 through 1016.	Adds redesigned linkage for additional support and structural strength during emplacement or stowage.
9-1440-252-30/23	Launchers 1021 through 4085 and 50000 through 50087.	Adds an oil cup to the erecting beam cylinder assemblies to permit proper lubrication of the felt washer strip in the cylinder.
9-1440-252-30/25	Launching-handling rails 1081 through 5378 and 50000 through 50153.	Provides lockwire for securing the pin in the rail release assembly.
9-1440-252-30/29, changes No. 1	Launcher field modification kits: 1 through 1016.....	Provides improved facilities for stowage of the vehicle stop-tail lights.
	1 through 144.....	Provides a dummy receptacle for storage and protection of the electrical system connector plug; also, an additional hand-wheel at the launcher attach points for a more positive locking effect.
	126 through 228.....	Provides mud guard fenders.
9-1440-252-30/33	Launchers 1021 through 4085 and 50000 through 50153.	Relocates telephone jack J3B from the power distribution box to the front of the launcher.
9-1440-252-30/34	Launching-handling rails 1081 through 5378 and 50000 through 50153.	Modifies the rail to insure correct actuation of the elevator warning device.
9-1440-252-30/35	Launching-handling rails 1081 through 5378 and 50000 through 50153.	Replaces breakaway pivot 8525316 with improved breakaway pivot assembly 11067504; also, adds a clamp and bracket to each side of the rail to reduce twisting of the umbilical cable assembly.
9-1440-252-30/36	Launchers 1021 through 4085 and 50000 through 50087.	Replaces air pressure regulating valve assembly 9018931 in the launcher hydraulic pumping unit with regulator assembly 8034938.

### 17. Differences Among Models

There are differences among models that affect direct and general support maintenance procedures. These differences exist because of

production changes not covered by MWO's. This manual provides coverage for these differences among models in the appropriate sections of the text as well as in the illustrations.

